

REFLEX NEUROSES ARISING  
FROM OCULAR AND NASAL  
ABNORMITIES.

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## ORATION IN OPHTHALMOLOGY.

### REFLEX NEUROSES ARISING FROM OCULAR AND NASAL ABNORMITIES.\*

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Reflex neuroses are not the property of the savage, but of civilized man. The more refined we become in the crucible of civilization, the more must we pay the penalty of that civilization through the neurotic tendencies which we either inherit or acquire. This underlying neuropathic predisposition is unfortunately present in a large proportion of the American population, and, when not inherited, is due chiefly to the irritating action of our changeable climate, some of the effects of which have been shown by Mitchell<sup>1</sup> and Lewis<sup>2</sup> in their study of chorea. To this and to the ambition to equal or surpass the activities of our rivals and associates may be ascribed our highstrung nervous energy, and inordinate desire to "hustle." If sooner or later there comes a nervous breakdown we may add this complication to our predisposing cause. On the other hand, the search for the *locum tenens* of the exciting cause has often proved to be as elusive as "the search for the glittering pearl."

Reflex nervous disturbances have long been

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\*The oration in ophthalmology, delivered before the general meeting of the Medical Society of the State of Pennsylvania, Reading, September 23 to 26, 1907.

<sup>1</sup>Lectures on Diseases of the Nervous System, 1881.

<sup>2</sup>Seasonal Relations of Chorea and Rheumatism, *Medical News*, November 13, 1886, and *American Journal of the Medical Sciences*, September, 1892.

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ascribed to perverted nerve impulses originating in peripheral end organs. Dental irritation from delayed eruptive teeth in children, phimosis, or adherent prepuce, incarceration of a nerve filament in the cicatricial plug of a uterine laceration, or an uncorrected depressed fracture of the skull, have all contributed their quota to the causation of minor epilepsy, habit chorea, vertigo, localized muscular spasms, neuralgia, neurasthenia, and gastric neuroses.

INFLUENCE OF THE EYE ON REFLEX NEUROSES.

That the eye is a most prominent ætiological factor in these systemic reflexes has long been conceded by careful observers. Ever since Donders<sup>3</sup>, in 1864, called the attention of the medical world to the fact that the group of symptoms known as asthenopia could be relieved by the proper refraction of the eye and the careful adjustment of glasses, our knowledge of the deleterious effects of eyestrain on the human organism has been steadily growing.

In those earlier days, when refraction was passing through its formative stages, the work of such Philadelphians as Dyer, McClure, Thomson, Norris, and Harlan in the diagnosis and correction of astigmatism was of inestimable value in the development of what we today term "modern methods of refraction." While these were the writers and lecturers of their day, there were other pioneers such as Goodman, Levis, and Morton, who gave great impetus to the work of practical refraction and won a large clientèle by their successful methods. It was not, however, until Weir Mitchell<sup>4</sup> accepted these results at their true face value, and publicly endorsed them, that the medical profession at large became properly

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<sup>3</sup>*Accommodation and Refraction of the Eye*, 1864, p. 259.

<sup>4</sup>*Medical and Surgical Reporter*, August 1, 1874, and *American Journal of the Medical Sciences*, April, 1876.



impressed with these new truths in ophthalmology. From that day until this, a period of almost three decades, the subject of ocular reflexes has been a controversial one, those most interested ranging themselves either as enthusiastic endorsers or as uncompromising unbelievers, while the conservative middle ground was but sparsely occupied.

Curiously enough, those who have been termed the "muscle faddists" early began to make a most active crusade in favor of eyestrain as the chief cause of many reflex neuroses, later on, however, advancing the statement that muscular imbalance was the real source of these pathogenic impulses. As far back as 1876, Stevens<sup>5</sup> was impressed with the relation of eyestrain to systemic neuroses, which he at first relieved by refraction alone. Gradually his attention was shifted from this and centred upon muscular imbalance<sup>6</sup> as one of the chief causes of these disturbances, which he then corrected by the adjustment of prisms. A decade later he became obsessed by the idea that all reflex neuroses should be ascribed to muscular errors, which could only be properly corrected by partial tenotomies<sup>7</sup> of the opposing muscles. While his views as a whole have been endorsed by few, many have accepted them in part, and all have given him credit for a valuable nomenclature of muscular terms, a new and practical operation for the relief of heterophoria, and much original investigation of this intricate subject.

Ranney<sup>8</sup>, who was a neurologist with a penchant for the practice of ophthalmology, accepted these views in their entirety, and, while he also acknowledged the necessity for the most careful preliminary

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<sup>5</sup>*Transactions of the New York Academy of Medicine*, 1876.

<sup>6</sup>*Transactions of the Medical Society of the State of New York*, 1880, p. 73.

<sup>7</sup>*Functional Nervous Diseases*, 1887.

<sup>8</sup>*New York Medical Journal*, February 27, 1886.

refraction, which often gave the desired relief, he proceeded to examine all cases of reflex neuroses for muscular imbalance, and to perform tenotomies for their relief. He stated<sup>9</sup> that he had cured many cases of epilepsy, chorea, and weak mentality. So careful an observer as the late Dr. Noyes<sup>10</sup>, who was then one of our leading ophthalmologists, placed himself on record as being conversant with many of Ranney's successful cases, and in part endorsed his views.

Following this came a veritable cyclone of heterophoric studies on the use of prisms, muscular gymnastics, and partial tenotomies for the correction of muscular errors and the relief of these complicating systemic reflexes. To this "symposium" Savage<sup>11</sup> contributed much original research in muscular anomalies, operative methods, and the demonstration of new theories, always conceding, however, the therapeutic value of properly corrected ametropia<sup>12</sup> in relieving headache, migraine, and other reflex disturbances.

Gould<sup>13</sup> tried to stem the tide of "tenotomies" by advocating a return to the older method of prism exercises, but, not succeeding, declared "surgery the despair of medicine," abandoned all ophthalmic surgery, and devoted his attention wholly to refraction. He, however, adopted the entire symptomatology of his foes, the "muscle faddists," and stated that complete relief from this host of reflex neuroses could only be obtained by properly adjusted glasses. He undoubtedly alleged too much. Nevertheless, there is much of undisputed truth in what he says, which is all the more reason for calm, dispassionate statements.

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<sup>9</sup>*Lectures on Nervous Diseases*, 1888, pp. 451, et seq.

<sup>10</sup>*Diseases of the Eye*, 1890, p. 191.

<sup>11</sup>*New Truths in Ophthalmology*, 1893.

<sup>12</sup>*Medical and Surgical Reporter*, July 29, 1882.

<sup>13</sup>*Medical News*, October 14, 1893.

The views of de Schweinitz<sup>14</sup>, who has voiced the feeling of the profession in the matter most fairly and concisely, are of great interest in this connection because of his well known conservatism. He says:

It is unquestionably true that fully seventy-five per cent. of ocular disorders depend on anomalies of the refraction, accommodation, and motility of the eyes. Correction of such faults is followed by the greatest good to the eye and to the general organism in which the strain has been interpreted by symptoms not necessarily suggestive of their origin. When one comes to think about them, these symptoms stretch out into an extraordinary train, but we have ceased to wonder, and as a matter of course investigate or cause to be investigated the eye whenever searching for the ætiology of headache of all kinds, vertigo, nausea, pseudo and habit chorea, neurasthenia, and other disease phenomena of similar manifestation. We have learned that many so called gastric troubles, tachycardia, flatulent and other types of dyspepsia, indigestions, night terrors, especially as they occur in children, may have a like origin, and we have found out that pains strangely and persistently situated in the nape of the neck, between and under the shoulder blades, at the end of the spine and deep in the mastoid may owe their origin to the same cause. These facts are widely, I think I may say universally, known, although, curiously enough, many of the most important of them find no place in the most used textbooks on general medicine.

Musser<sup>15</sup> expresses views almost identical with these, when he says, "Who has not seen correction of errors of refraction relieve so called 'bilious attacks,' periodical vomiting, anorexia, indigestion, and other gastric symptoms. The cure of grave organic ocular defects relieves similar gastric conditions."

Hansell<sup>16</sup> has carefully summed up this interrelation between the eye and the general system in saying: "Any theory of the origin of disordered func-

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<sup>14</sup>Address before the Medical and Chirurgical Faculty of Maryland, April 26, 1900.

<sup>15</sup>*Journal of the American Medical Association*, November 4, 1905.

<sup>16</sup>*Neuroses of Eyestrain*, in Posey and Spiller, 1906, p. 775.

tion which does not embrace a consideration of the ocular apparatus is unscientific and open to criticism. There are incessant demands on the peripheral organs of vision which are in direct connection with the central nervous system, and the many ways in which this connection is provocative of disordered function is a fact of deep significance in the causation of disease. The cause or association is, moreover, continually active during the life of the individual."

Many distinguished neurologists, such as Wood<sup>17</sup>, Gray<sup>18</sup>, Starr<sup>19</sup>, Féré<sup>20</sup>, and Pritchard<sup>21</sup>, have endorsed these views in part, by acknowledging the ætiological entity of uncorrected refractive errors, but not conceding the equally deleterious effects of muscular imbalance; while others, whose experience has been different, still remain unconvinced that ocular defects can excite reflex disturbances.

The unbiased observer must concede at least four ocular factors which may become the exciting cause in producing reflex neuroses: 1, Ciliary spasm, or strain from uncorrected ametropia; 2, accommodative effort, whether in youth or old age (presbyopia); 3, muscular imbalance; and, 4, painful ciliary scar, or shrunken eyeball. As has been previously pointed out, the underlying, predisposing cause must be present and active. Hence these factors are most liable to originate reflex symptoms in the neurotic subject, while the phlegmatic individual may wholly escape their deleterious action.

1. Eyestrain from uncorrected ametropia stands at the head of the active factors causing these annoying reflexes. It takes its origin in the ciliary

<sup>17</sup>Pepper's *American Textbook*, 1893.

<sup>18</sup>*Nervous Diseases*, by American Authors, 1895, p. 312.

<sup>19</sup>Posey and Spiller, p. 799, and *Familiar Forms of Nervous Diseases*, 1890, p. 270.

<sup>20</sup>*Twentieth Century Practice*, 1897, x.

<sup>21</sup>Sajous's *Annual*, iii, 1899.



effort made to overcome errors in the static refraction, or to correct axial defects. These errors are hypermetropia, myopia, and astigmatism in varying combinations. As the ciliary muscle may act irregularly, spasmodically, and unequally, its action must be wholly suspended by complete cycloplegia in order that the ametropia may be accurately measured. Having carefully ascertained the total refractive error, we must make due allowance for the free play of the ciliary muscle in prescribing the correcting glass. Failure at this point may wholly annul our efforts to remove the exciting cause. Too strong a glass will blur the vision, while too weak a correction will not relieve the strain; hence, failure from either extreme should be avoided by ordering the happy medium.

2. Unusual accommodative strain is a fruitful source of reflex disturbances. The accommodation should, therefore, be tested in every case, and a careful record made. Subnormal accommodation may be found in the eyes of children or youths, as well as in those of adults, but it is manifested chiefly after the age of forty, when it is known as presbyopia. The eye may be quite comfortable under the distance correction and still suffer whenever near work is attempted. An additional correction for near work must, therefore, be ordered in every case of subnormal accommodation, whether young or old. Neglect of this simple measure will often result in failure to secure the desired relief.

3. Heterophoria, or imbalance of the extraocular muscles, has long been conceded to be a most vicious agent in the causation of these reflex neuroses. Errors in the vertical muscles (hyperphoria) are probably more active because harder to overcome, while the horizontal disturbances (esophoria and exophoria), although more amenable to treat-

ment, are, nevertheless, most persistent in causing these perverted nerve impulses. We have at our command four different ways of remedying these defects: 1, Correction of the error through correction of the refraction; 2, correction of the deviation by the adjustment of prisms for constant wear; 3, orthoptic training or prism exercise; and, 4, readjustment of the tendinous insertion by partial tenotomy. Some may escape these deleterious effects through monocular vision, while others with good vision in both eyes may not possess the power of binocular fusion. The physician who ignores the proper correction of muscular errors simply courts failure to relieve many systemic reflexes, by overlooking a most important exciting cause.

4. All observers agree that painful scars may cause annoying reflexes, and scars in the ciliary region are no exception to this rule. Traumatism of the ciliary body, pressure on the sharp spicules of a chorodial bone, or the undue shrinkage of an old phthisis bulbi have all demonstrated the necessity of enucleation in order to remove the exciting cause. Numerous cases of epileptiform seizure have been relieved in this way (Stevens<sup>22</sup>, Stoewer<sup>23</sup>, Galezowski<sup>24</sup>), which simply goes to prove the contention of Landon Carter Gray that epilepsy is only a symptom, and may be either central or peripheral in origin.

#### NASAL ORIGIN OF REFLEX NEUROSES.

Although but little attention has been given to the nasal origin of systemic reflexes, many well known observers have recorded their affirmative views. H. C. Wood<sup>25</sup> has expressed the opinion that diseases and malformations of the nasal cavity, and aural

<sup>22</sup>*Alienist and Neurologist*, January, 1880.

<sup>23</sup>*Klinische Monatsblätter für Augenheilkunde*, 1896, p. 289.

<sup>24</sup>*Recueil d'Ophthalmologie*, January, 1886.

<sup>25</sup>*Prepper's American Textbook*, i. p. 620.

lesions, may give origin to habit chorea and minor epilepsy. Pritchard coincides with these views, laying special stress on cases of obstructive disease of the nasal passages. Stoewer states that many reflexes are cured by the removal of painful scars, or irritation from the nose and ear; while Starr concedes that local spasmodic twitchings of the head and neck may possibly be caused by nasopharyngeal irritation.

That many ocular symptoms may be duplicated or caused by intranasal lesions must be accepted as a verity. There is a "deadly parallel" of reflex symptoms that will tax one's diagnostic ability to the utmost in properly locating their origin. Many such patients who pass from one oculist to another with but slight change in glasses and but little relief are what might be termed "nasal asthenopes." They will never find ocular comfort until the intranasal lesion is corrected. It is often necessary, however, by careful refraction, to eliminate the ocular element by the process of exclusion before proceeding to the nasal treatment. Nieden<sup>26</sup>, who was a pioneer in the study of the relation between diseases of the eye and nose, endorsed these views when he said: "I would add that from my own observation there are many cases of *asthenopia* with inability to use the eyes for any great length of time, with symptoms of dazzling, and inability to fix objects, and for which with entire absence of all pathological alterations in the eyes, or of other visible causes, we can find no other rational reason than a chronic nasal catarrh; whilst finally, all the asthenopic disturbances disappear when the nasal disease is relieved."

What, then, are the nasal conditions that may originate these perverted nerve impulses? The three

<sup>26</sup>*Archives of Ophthalmology*, 1887, p. 415.

most active ætiological factors are: 1, Pressure contact; 2, hyperæsthesia; and 3, nasal obstruction.

1. The first and most important causative agent is a condition which we may term pressure contact. The middle turbinate bone is usually the offending member, and is so often wedged in between the two vascular cushions of an engorged inferior turbinate and a sensitive septal puff that many mystifying reflex impulses are originated, the most pronounced of which are localized muscular twitchings or choreiform movements of the face, head, and neck, while intense frontal headache and eyeache are more frequent effects. The middle turbinate, however, is not always the offending member. I have seen the pressure contact of a sharp sæptal spur digging into an inferior turbinate cause similar disturbances, which were promptly relieved by the removal of the spur. The pull of a contracting adhesion between the middle turbinate and the sæptum may also cause annoying reflexes.

2. Another important ætiological element is hyperæsthesia of certain areas in the upper air chambers of the nose. These sensitive points I have found to be most frequently located in a hyperæsthetic area covering the tubercle of the sæptum, which, when irritated, quickly becomes engorged by vascular dilatation, and thus makes pressure contact against the closely approximated middle turbinate. Irritation of this sensitive area is so provocative of distinctly localized eye symptoms that I have long since dubbed it "the eye spot of the nose." Supra-orbital neuralgia, referred eyepain, lacrimation, burning or smarting of the lids, blepharitis, conjunctival congestion and other similar disturbances, may result from this reflex manifestation. The "therapeutic test" of this oversensitiveness may be verified by the simple act of making a local applica-



tion to this area. This will frequently precipitate an attack which the patient will recognize as very similar to the condition from which he seeks relief. If this area is so sensitive to the mild touch of an applicator, what may we not expect as the result of prolonged pressure contact? In fact, we must accept as an infallible rule the dictum that *pressure contact in the nose will always excite some reflex disturbance when any hyperæsthetic area is impinged upon*. If, therefore, the middle turbinate interferes, it must either be removed, or broken and set over. On the other hand, if the sensitive sæptal puff is too large or becomes too easily engorged, it must be reduced or "pinned down" by interrupted linear cauterization.

3. The third active agent is nasal obstruction, which, as Pritchard observes, may become an important pathogenic factor. We should never forget that *normal respiration occurs only through the superior meatus of the nose*. Interference with free breathing necessarily produces suboxidation, which, by increasing the sensitiveness of the whole system, renders it more liable to reflex disturbances. In order, therefore, to restore nature's supreme function of unimpeded respiration, it may be found necessary either to remove the middle turbinate, to shrink the inferior turbinate by cauterization, or even to excise the tonsils, if too large; *for without free breathing health cannot exist*.

While it is not my purpose to unduly emphasize the nasal phase of the subject in an address on ophthalmology, I shall, nevertheless, call attention under each individual heading to the possibility of such error, and where necessary, cite illustrative cases or draw comparative inferences.

#### INDIVIDUAL MANIFESTATIONS OF REFLEX NEUROSES.

*Headache*.—Headache has been conceded by all to be the one prominent symptom of eyestrain. Oc-

asionally it is wholly absent. It is usually frontal in character and exaggerated by use of the eyes, growing worse as the day advances, reaching its crisis in the evening, and often superinducing insomnia. There is a great variation in the tolerance of the eye to high errors of refraction, but in neurotic subjects even low grade errors may create a veritable "nerve storm." This pain frequently shifts from the supraorbital to the temporal region, and at times may become vertical. More infrequently the eyeball itself develops a feeling of soreness. Occipital headache, on the other hand, is the salient symptom of disturbances in the balance of the extraocular muscles. It may be a deeply seated, boring pain, or only a stiffness at the back of the neck. It is usually accompanied by carsickness (panorama headache) and light annoyance (theatre headache), and can thereby be distinguished from a similar headache caused by certain intranasal lesions.

Intense frontal headache on first awakening in the morning occasionally arises from eyestrain, but is usually nasal in origin, and can sometimes be differentiated by the mere act of bending forward. If there is intranasal pressure this suddenly increased flux of blood will cause exaggeration of the pain. If the patient is awakened during the night by a sudden, stablike, frontal pain, we may consider this of nasal origin, as mouth breathing allows vascular stagnation in the nasal chambers, and the long continued pressure contact often precipitates an attack of neuralgic pain. This attack may disappear on awakening, may continue throughout the day, or may be quiescent during the day and reach its crisis at the twilight hour. A "Sunday morning headache" is usually nasal in origin, the result of prolonged pressure contact following overindulgence in sleep. A "Monday morning

headache," on the other hand, is more liable to follow the indiscretion of excessive Sunday reading, and is, therefore, ocular in origin. Another morning headache of ocular origin may be the delayed manifestation of a "theatre headache" which had its origin the night before. This usually arises from one of three causes: 1, Light annoyance, in heterophoric patients; 2, unusual strain of both superior recti, from sitting close to the stage and directing the eyes upward; and, 3, the eyestrain of ametropia.

To demonstrate the necessity of carefully examining the nose when glasses fail to give relief, I will cite an illustrative case:

CASE I.—A neurasthenic young lady consulted me eight years ago for multiple head pains. She had been refracted by several excellent oculists without relief. My test met with just as indifferent success. I then advised her that the nose was at fault, but she did not accept this advice. For the next six years she passed from one office to another, "receiving but slight changes of five degrees or over in her astigmatic axis," but still without relief. When she returned one year ago she consented to have nasal treatment. I removed the middle turbinate on the side of greatest pain, and cauterized the other side. She has been most comfortable ever since, having gained in health, strength, and mental composure, and can now wear her glasses with comfort. Here both nose and eyes were at fault, but the head pains she sought relief from were wholly nasal in origin.

*Migraine.*—Migraine, or sick headache, occurs in paroxysms of greater or less severity at irregular intervals, and may reach the extreme condition of what is known as "blind headache." Scotoma scintillans is a very frequent symptom, and hemianopsia is not uncommon in these neuralgic attacks. Nausea and vomiting may be concomitant disturbances. While these cases often originate in high degrees of astigmatism with asymmetric axes, the lower grade errors have been known to excite similar disturb-

ances in neurotic subjects. In the majority of these cases, however, some error in the muscular balance will usually be found (chiefly hyperphoria), which prisms may temporarily relieve, but sooner or later demands operative interference.

CASE II.—Male, aged fifty-four, intelligent but neurotic, was wearing glasses to correct hyperopia with presbyopia, and a one and a half degree prism for hyperphoria, but with only intermittent relief from his migraine. Here partial tenotomy gave the desired relief, and led the patient to remark that "where once he suffered the torments of the damned after a half hour's reading, he could now read fourteen hours with comfort."

Many minor neuralgias about the head and face have been relieved by the proper correction of refractive errors. It may be somewhat difficult to explain the exact method of causation of such disturbances, but it is not difficult to demonstrate their cure, when relief is so promptly gained following the adjustment of glasses. Conservative men like Risley<sup>27</sup>, Hansell<sup>28</sup>, Weeks<sup>29</sup>, Zentmayer<sup>30</sup>, and Zimmerman<sup>31</sup> have recently placed themselves on record as favoring the ocular origin of migraine in at least a portion of the cases. The refractive error is, of course, only the exciting cause. If, therefore, these reflexes should reappear, the refraction must be carefully retested and new glasses ordered to correct any physical change.

On the other hand, we must not forget that some of these cases, even though complicated with an ocular defect, are wholly nasal in origin. The therapeutic test will prove this.

CASE III.—A young lady—also a typical case—was carefully refracted while at school by a prominent oculist, and

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<sup>27</sup>Neuroses of Eyestrain, in Posey and Spiller, p. 750.

<sup>28</sup>*Ibid.*, p. 820.

<sup>29</sup>*Transactions of the American Academy of Ophthalmology and Otolaryngology*, 1905.

<sup>30</sup>*Pennsylvania Medical Journal*, June, 1908.

<sup>31</sup>*New York Medical Journal*, November 21 to 28, 1903.



was still wearing the same glasses with comfort. There was no relief, however, from the "nerve storms" that were ushered in by light flashes, hemianopsia, excruciating headpains, and finally almost total obscuration of vision. It was found that nasal applications would yield temporary relief. Excision of the left middle turbinate and cauterization of the right inferior turbinate have brought about almost complete immunity, there having been but one mild attack during the past year.

CASE IV.—A physician had long suffered from typical migraine. A careful refraction was made, glasses ordered, and worn. Eyes are now comfortable but migraine persists. The attacks are ameliorated by local applications to the nose. The pressure contact present in the nose is undoubtedly responsible for his suffering, but he still hesitates to undergo the slight operation necessary.

*Localized muscular spasms.*—Muscular spasms, such as blepharospasm, facial twitchings, jerking of the head, head tilting, spinal curvature, and other like disturbances have been noted as the result of ocular defects. Head tilting may come from two causes, 1, the effort to bring into alignment eyes that are displaced by faulty muscular balance, chiefly in the vertical (hyperphoria), and 2, the attempt to gain a clearer view of objects through an oblique astigmatism. Spinal curvature, on the other hand, comes more frequently from inequality in the length of the limbs, causing tilting of the pelvis and displacement of the spinal column, with its attendant backache. The addition of a high heel to the shorter limb, under the supervision of an orthopædist, will promptly relieve this, as was first demonstrated by the late Dr. Goodman, who was both an orthopædist and an oculist. While blepharospasm frequently arises from eyestrain, it may also occur from loss of sleep, mental exhaustion, and excesses in coffee and tobacco. Intranasal lesions must also be reckoned with as ætiologic entities.

CASE V.—A young lady suffered from asthenopia, blepharospasm, and occasionally some twitching at corner of

mouth. Asthenopia was relieved by refraction, but twitching persisted. Excision of a tightly pressing right middle turbinate, and cauterization of the left inferior turbinate, brought relief from the spasm, and physical comfort through improved breathing.

CASE VI.—A mechanic had been suffering from left sided facial twitching and blepharospasm, rhythmic in character, occurring every two minutes, awake or asleep, for over five years. He had no error of refraction. The left middle turbinate was pressing hard against the inferior turbinate, and in places adherent to it. The middle turbinate was carefully removed. As healing progressed the gradual lessening of the spasm could be noted, first to an interval of ten minutes, then to one hour; later he passed a comfortable night, and finally but one or two mild spasms occurred during the day. Having convalesced thus far he told me he was again able to talk without making a wry face, and had secured an excellent position. He thus disappeared from observation.

CASE VII.—A painter had suffered for twenty years with marked facial spasm and jerking of head to the left, at the same time protruding his tongue in a curious manner. He was hyperopic, astigmatic, and presbyopic. Glasses relieved the refractive error, but spasm persisted. Examination showed that the right middle turbinate was digging into the *sæptum*. I broke it in its middle third and set it over. Improvement was most marked, but was not permanent because contraction occurred, again bringing the bone into pressure contact against the *sæptum*. The middle turbinate was then excised, following which convalescence was progressive up to complete recovery.

*Chorea*.—It has been asserted by Ranney and Stevens that a majority of choreics can be relieved by the proper adjustment of glasses or by tenotomies where muscular errors exist, but other observers do not wholly accept these views. In the first place, it is exceedingly difficult to make an accurate study of ocular defects when the head movements are such as almost to prevent a satisfactory examination, and in the second place, there are many other contributing causes, such as the atmospheric conditions in March, which Mitchell and Lewis have shown to be prominent factors.

Cheney<sup>32</sup> believes that choreics often recover without treatment, but is convinced that their rapid recovery after correction of muscular or refractive errors makes it more than probable that these defects bear a causal relation. Starr and Gray believe that refractive errors may cause chorea and local muscular twitching, but do not concede the possibility of muscular anomalies causing reflex disturbances. Wood<sup>33</sup> is, however, more decided in his views when he says: "Especially are eyestrain and nasal difficulties apt to cause in childhood persistent chorea, and it is, therefore, essential in every case which resists treatment to thoroughly examine these organs." Weir Mitchell and Osler<sup>34</sup> acknowledge the causal relation of eyestrain in habit chorea. My experience has convinced me that in some cases the eyes may be the exciting cause. I will cite an example.

CASE VIII.—A youth, aged fifteen, was of a nervous temperament, ambitious, and very studious, a musical prodigy. He had suffered from habit chorea for two years. He accidentally complained of his eyes, and was referred to me for refraction. A cycloplegic test revealed hyperopia with astigmatism, for which glasses were ordered. There was prompt cessation of the choreic movements. I have re-tested him after an interval of eight years, and find him grown to be a healthy, bright young man, without any recurrence of these attacks.

On the other hand, where the element of oxidation is such a prominent factor, it would seem as though an obstructive nasal lesion would be a pathogenic entity to be contended with, even though pressure contact was present.

CASE IX.—A French girl, neurotic but dull, had more or less mental hebetude. She was thin and anæmic, with dusky skin. Following an attack of grippe she developed

<sup>32</sup>*Boston Medical and Surgical Journal*, February 20, 1890.

<sup>33</sup>Pepper's *American Textbook*, i, p. 631.

<sup>34</sup>*Archives of Pediatrics*, January, 1897.

chorea, the chief symptom being a jerking of the head backward. There was also some twitching of the body. By supporting the head with the hand held on the back of the neck, she could eat or converse. In right nostril there were adhesions between the inferior and middle turbinate, and the middle turbinate was jammed tightly against the sæptum. She never stooped or bent over, as her symptoms at once became exaggerated and a severe headache was precipitated. The eyes were free from refractive error. The right middle turbinate was carefully removed, and the left inferior turbinate was cauterized. She was thereby freed from the nervous irritation, and increased oxidation has brought her rosy cheeks, a gain of thirty pounds in weight, and more mental nimbleness than she had ever before exhibited.

*Minor epilepsy.*—Petit mal belongs to the same category as chorea. Its pathology is uncertain. Neurologists like Wood, Gray, Féré, and Stoewer believe that this condition may originate in eye-strain. Some cases, if not cured, have at least been benefited by treatment of the congenital ocular defects. Stevens, Ranney<sup>35</sup>, Gould<sup>36</sup>, Colburn<sup>37</sup>, Capps<sup>38</sup>, and Reber<sup>39</sup> have reported cases relieved by correction of refractive errors. On the other hand, Stevens, Stoewer, and Galezowski have each reported cases of reflex epilepsy from ciliary injury or irritation that were relieved by enucleation of the eyeball.

I have followed with great interest two patients who first consulted me about six years ago. One suffered from an error of refraction, and the other from a nasal lesion. Strangely they were both so fond of sweets that they indulged in "candy sprees." I do not recall having read that the ingestion of sweets is an exciting cause of epileptiform seizures. I presume physiological chemistry might explain

<sup>35</sup>*New York Medical Journal*, January 2 to 9, 1897, and *Eyestrain in Health and Disease*, 1897.

<sup>36</sup>*Journal of the American Medical Association*, July 5, 1902.

<sup>37</sup>*Chicago Medical Recorder*, July, 1894.

<sup>38</sup>*New York Medical Journal*, September 16, 1899.

<sup>39</sup>*Pennsylvania Medical Journal*, November, 1902.



this as due to the breaking up of the carbohydrates, and the liberation of an excess of carbon dioxide into the blood.

CASE X.—A young man with subnormal mentality, no occupation, had a neurotic family history. He had an inordinate desire for sweets, and suffered from frequent epileptiform seizures. Being warned to desist from sweets, he moderated his indulgence. He was fitted with a correction for hyperopia and astigmatism, and has gone along in comfort for several years. He has lately consulted a colleague, who reports a relapse, but whether from the renewal of his candy habit, or from a change in his refractive error, he has not since advised me.

CASE XI.—A young business man, after eating a pound of candy, usually at bedtime, almost invariably suffered from an attack of *petit mal* about midnight, much to the alarm of his wife. He was a mouth breather, and suffered greatly from the engorged turbinates which obstructed his nostrils. This condition was corrected, and indulgence in candy interdicted. He has since had but one or two convulsive seizures a year, where previously they occurred every two weeks. There are still two hyperæsthetic areas which should be cauterized. He had previously worn glasses, and was retested without having his neurotic condition influenced thereby.

While I do not believe that all cases of minor epilepsy can be traced to a nasal or ocular origin, the intelligent physician will undoubtedly consider it his duty to examine both these organs for possible ætiological factors.

*Gastric neuroses.*—These are concomitant symptoms with many ocular defects. Any ciliary irritation may cause anorexia, nausea, and vomiting. One of the most characteristic symptoms of ciliary inflammation following operation or injury is the severe vomiting which often occurs. A contracting scar in the ciliary region, or the shrinking of an eyeball over a calcareous choroid may produce prolonged gastric disturbance. On the other hand, disturbances of the extraocular muscles, persistent diplopia, or even the usual tests for heterophoria,

may excite nausea and vomiting. The wearing of prisms, muscular gymnastics, and the use of too strong lenses may set up a similar condition. It is easy to demonstrate this to one's own satisfaction by wearing such lenses for a short time. Per contra, when some high refractive error has been properly corrected, the accidental removal of the correcting glasses will often precipitate a recurrence of the gastric disturbance.

CASE XII.—A neurotic female had worn high correcting prisms for a double muscular error (hyperexophoria) for many years. If glasses were broken she had to go to bed, and in a short time suffered from profound sick headache accompanied by nausea and vomiting. Instead of submitting to a proper tenotomy for restoration of the muscle balance, she now carries several pairs of glasses with her as reinforcements in case of accident.

Dizziness, or gastric vertigo, is probably the only symptom that would naturally suggest the necessity for an ocular examination to the ordinary practitioner; and yet, as Musser says, there are many other symptoms, such as bilious attacks, periodical vomiting, anorexia, and indigestion, that may be relieved by a careful test of the eyes. Alger<sup>40</sup> has recently reported a case of severe abdominal pain in which low grade plus cylindrical glasses gave prompt and lasting relief. Two surgeons had made a diagnosis of either gallstones or appendicular inflammation, but fortunately for the patient the condition was correctly diagnosed by Morris as a reflex neurosis due to eyestrain. Refraction under complete cycloplegia and the wearing of the proper glasses quickly relieved the gastric suffering. The number of such cases now being placed on record should make us pause, reflect, and give the oculist the benefit of the doubt, before inflicting lavage or exploratory incision upon suffering humanity.

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<sup>40</sup>*New York Medical Journal*, June 8, 1907.

It goes without saying that there is a close parallelism between these ocular reflexes and those arising from nasal disturbances. In fact, I may truthfully assert that a very large proportion of gastric neuroses are of nasal origin. The hyperæsthetic areas in the upper air chambers, the lowered oxidation through lack of free breathing, and the swallowing of acrid secretions all tend to upset the digestive organs. In addition to this, nocturnal mouth breathing permits chilling of the abdominal viscera, while insidious bedroom drafts often add to the disturbance, and the ultimate matutinal condition of the sufferer is only comparable to the utter wretchedness of the poet Cowper, when he exclaimed: "I awake like a toad out of Acheron, covered with the ooze and slime of melancholy." The morning headache previously referred to, the nausea, vomiting, and intermittent diarrhœa or constipation, show a marked disturbance of metabolism which only the absolute exclusion of ocular errors can differentiate as a gastric neurosis, wholly nasal in origin.

*Neurasthenia.*—Neurasthenia may likewise be the sequela of uncorrected eyestrain. The ocular error, however, may simply be coexistent and bear no causal relation to the neurotic condition. If this condition persists after the refraction has been properly corrected we should then turn to the nose in our search for the exciting cause. Pressure contact and obstruction to free breathing may cause lowered oxidation and faulty metabolism, and a normal systemic balance can only be reestablished by correction of these physical defects.

CASE XIII.—A young lady, a college student, suffered from neurasthenia, intense eyepain, headache, backache, and fainting spells. There was a low grade refractive error. Muscular imbalance varied daily, from one to three degrees of hyperphoria. There was intense pressure of the left middle turbinate against a hyperæsthetic sæptum.

Glasses gave no relief and were abandoned. Removal of the middle turbinate relieved all of her neurasthenic symptoms. The hyperphoria completely disappeared, and she now reads and studies with perfect comfort.

The frequency with which muscular errors disappear after the removal of pressure contact in the nose leads me to believe that this lesion may bear a causal relation to heterophoria, a question that I will reserve for future discussion. Muscular imbalance may, nevertheless, exert an irritating influence on neurasthenia.

CASE XIV.—A merchant had neurasthenia following business worries. Insomnia was persistent. A long vacation had brought no relief. He came for change of glasses. He was wearing a correction for myopia, astigmatism, and presbyopia. Examination revealed hyperphoria of two degrees. The addition of a vertical prism to his glasses relieved the eye symptoms and caused immediate disappearance of the insomnia. His mental depression also improved.

Neurasthenics, however, are more liable to suffer from insomnia and sudden wakefulness when there is nasal obstruction present. This arises from lowered oxidation in the same way that we are awakened by the sudden closeness of the atmosphere in a bedroom.

CASE XV.—A publisher had suffered from neurasthenia, headache, insomnia, reflex cough, indigestion, and attacks of diarrhœa. He had just returned from an ocean voyage. There were obstructive lesions of both nostrils. Refraction gave no relief. Cauterization of the inferior turbinates and of the sensitive sæptal puffs brought complete relief from these neurasthenic symptoms. The insomnia and reflex cough disappeared immediately following the first cauterization, but the gastric neuroses were not relieved until after free breathing was reestablished. There has been no recurrence during the past five years.

#### CONCLUSIONS.

The following salient points should always be borne in mind when searching for the exciting cause of reflex neuroses:



1. The eye and the nose are undoubtedly most important factors in the ætiology of reflex neuroses and should, therefore, be thoroughly examined and positively excluded before beginning a search for other causes.

2. Ocular and nasal reflexes possess many manifestations in common, which should be carefully differentiated at the earliest possible moment.

3. Eyestrain, whether from ametropia, subnormal accommodation, or muscular imbalance, should be accurately corrected in order to eliminate the eye as a causative factor.

4. An atrophied eyeball, with contracting ciliary scar, should be enucleated.

5. Pressure contact in the nose will always excite some reflex disturbance when any hyperæsthetic area is impinged upon, and should, therefore, be eliminated.

6. Every obstruction to free breathing should be removed.

7. Recurrence of any reflex neurosis demands re-examination and renewed search for the original exciting cause.

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